THE · EXTENSION PATHOLOGIST

A NEWS LETTER FOR EXTENSION WORKERS INTERESTED IN PLANT DISEASE CONTROL

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CONTENTS

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GLEANINGS FROM PAPERS PRESENTED AT RICHMOND MEETING OF AMERICAN PHYTOPATHOLOGICAL SOCIETY

With the thought that some of the points brought out in the papers presented at the Richmond meeting (December 27 to 30, 1938) would be helpful in extension work, several of the extension pathologists who were at the meetings (Boyd, Chupp, Allison, Burke, Shaw, and Haskell) have collaborated in making the following short digests of papers and abstracts. The references are to the January number of "Phytopathology."

White rust of spinach caused serious damage in Texas during the 1937-38 season. The organism is indistinguishable from the one found on Chenopodium capitatum. Among the 150 varieties of spinach tested, none were immune, but Viroflay was much more resistant than Bloomsdale and a number of other varieties (Ivanoff, p. 12).

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293-39

A number of actinomycetes have been isolated from pox-infected sweetpotatoes. Reinoculation established that these organisms were able to reproduce the disease under controlled conditions (Martin and Person, p. 17).

When bean plants were grown in a high nutrient salt concentration they were more susceptible to Rhizoctonia solani than when grown in a low nutrient concentration. The nutrition of the fungus, however, did not seem to affect its virulence (Anderson, p. 1).

Application of fungicides did not control downy mildew of onions. The inoculum was carried over winter in top-set and other perennial onions. When these beds were destroyed in one township, the number of fields infected was 28 percent as compared to 68 percent in adjoining townships where no eradication campaign was waged (Newhall, p. 18).

The earlier onions are planted in the Elba, N. Y., muck area, the less smut there is in the crop. The low soil temperatures are unfavorable for the smut fungus (Felix, p. 6).

Marsh spot, or internal discoloration of peas, has long been known in Europe and lately reported from the United States. The trouble is caused by lack of manganese. Under alkaline conditions more manganese sulfate is required to correct the trouble than under acid conditions (de Bruyn, p. 3).

Blossom-end rot of tomato is probably caused by much more complex factors of environment than have formerly been considered. The application of superphosphate had a marked effect in reducing the amount of injury (Foster, p. 7).

A seed treatment for beans affected with bacterial blight is reported. The bean seed is soaked 12 to 14 minutes in a solution of 1-500 mercuric chloride in 70 percent ethyl alcohol plus 2 percent acetic acid. Although there is some injury to germination, the effective control measures are considered adequate to sacrifice some loss in stand (Person and Edgerton, p. 19).

Preliminary tests with chloropicrin (0.88, 1.76, and 3.52 cc. per liter of space) in fumigating kale seed 24 hours for the control of black-rot indicated that the treatment equaled that of $HgCl_2$ (Nugent and Cook, p. 19).

Four sprayings of tomatoes during the last third of the season gave essentially as good disease control and yield in New York as did 12 sprayings during the whole season. Bordeaux mixture did not give as large an increase nor as large a percentage of No. 1 fruit as did red cuprous oxide (Horsfall and Heuberger, p. 11).

Reduction in infection of clubroot on cabbage and a marked decrease in plant injury were obtained in New Jersey when the pH of the soil was maintained at 7.0 or above, regardless of whether the corrective used contained potassium, sodium, calcium, or magnesium (Haenseler, p. 9).

Chloropicrin was compared with carbon disulphide for treating soil in Rhode Island in the control of the root-knot nematode. It was not necessary to eradicate the nematodes completely, but only to delay infection so that the plants could develop an extensive root system. Direct injection into the soil proved superior to aqueous drenches (Howard, Stark, and Smith, p. 11).

Chloropicrin for controlling Fusarium lycopersici was injected directly into the soil, which was then covered for 3 days with glue-coated paper. At 250 to 450 lb. an acre, it controlled the Fusarium satisfactorily as well as the root-knot nematode and destroyed certain weed seeds (Young, p. 25).

Only a few of the 120 to 150 strains and varieties of peas tested for susceptibility to Septoria pisi appeared to be tolerant. Blue Prussian, an importation, showed most resistance. Infected pea refuse is an important source of inoculum. High humidities are essential for infection (Zaumeyer, p. 25).

The Hawkesbury watermelon has been demonstrated as suitable for commercial use under growing conditions in Virginia when compared with other wilt-resistant varieties (Cook and Nugent, p. 5).

Resistance of beans to anthracnose can be explained by a system of 10 Mendelian factors arranged in 3 allelomorphic series (Andrus, p. 1).

Thirteen distinct physiologic races of bean rust have been isolated. These races cannot be distinguished morphologically. Moreover, they may shift geographically from year to year (Harter, p. 9).

A new forcing tomato named "Bay State", that is resistant to Cladosporium, is reported (Guba, p. 9).

Irrespective of age, distinct differences in mat growth and color exist in different isolations of Fusarium lycopersici. Strains with appressed growth seem to be distinctly less pathogenic than those with raised or cottony growth (Wellman and Blaisdell, p. 24).

If one uses only wilted or dead tomato plants, he does not get a true picture of resistance to Fusarium wilt. But if he also takes into consideration the time required for wilting to begin, he can determine the resistance rather accurately. Using these two criteria a large number of tomato varieties commonly grown at the present time are classified (Young, p. 25).

Calomel as a soil treatment for potato scab control seems unreliable since it failed to control scab caused by the Michigan scab organisms (Glenn KenKnight, p. 13). Calomel was effective in preventing scab when organisms from Long Island were used.

Purple-top wilt of potatoes was induced by caging aster leaf hoppers (Macrosteles divisa) indicating that this disease is due to the aster yellows virus. Tubers did not transmit the disease (Leach, p. 14).

The effect of acid fertilizer on potato scab is dependent on the change in soil reaction rather than a direct effect on the scab-causing organism (Cook and Nugent).

The addition of fertilizer, plowing under a cover crop, adding manure to the soil or combinations of these three practices tend to reduce the amount of Rhizoctonia on potatoes (Blodgett).

The amount of potato scab on acid soils can be explained by the fact that small amounts of soil near the tubers are often sufficiently alkaline for the development of the scab organisms (Daines and Martin). Accurate measurements with a thermocouple were necessary to determine these soil variations.

Pseudo-net-necrosis, Aucuba mosaic, and Canada-Streak of potatoes are closely related, and there is no relationship with Calico (Dykstra, p. 6).

Evidence presented indicated that psorosis A, psorosis B, concave gum disease, blind pocket, corky bark, and crinkly leaf of citrus are closely related, are all transmissible by budding, and are probably caused by virus (Fawcett, p. 6).

Lily mosaic is the result of the joint action of a virus from cucumbers and one from tulip (Brierley, p. 3).

Losses up to 30 percent have occurred in California from a vein-banding disease of grapevines that has been shown to be transmissible by root grafting (Hewitt, p. 10).

Experiments suggest that the presence of one virus disease in sugarcane immunizes it to certain other viruses and has no effect on its subsequent infection by certain other viruses, further developing the idea that this method might be used to check the validity of the virus classification (Forbes, p. 7).

A report on the occurrence of two virus diseases on the pea, together with symptoms and a list of other plants affected by the viruses (Zaumeyer, p. 25).

Insect juices inhibit the active properties of a virus and may account for the difficulty experienced in recovering viruses from insect vectors (Black, p. 2).

Evidence presented indicated that phony peach-disease virus is localized in the woody cylinder, and it is suggested that in transmission work, both bark and wood be used in grafting (Hutchins, p. 12).

Dormant peach trees immersed in hot water for 40 minutes at 48° C. gave no indication of phony peach disease, but trees treated 35 minutes or less at 48° C. showed typical symptoms of the disease (Hutchins and La Rue, p. 12).

Emulsified oils of cotton, corn, rapeseed, linseed, peanut, sesame, tung, cod-liver, and sperm had a marked fungicidal value in control of blue mold. This fungicidal value was increased by addition of copper, such as bordeaux mixture, basic copper sulfate, copper resinate, copper oxychloride, and cuprous oxide. The last is the best (Clayton and Foster, p. 5).

No consistent difference was found in the percentage of severe root knot of tobacco for different dates of transplanting, but for 3-year averages there was a significant difference in yield and value per acre. Early transplanting yielded 980 pounds valued at $188.52 an acre; the medium, 845 pounds, valued at $151.91; and the late, 732 pounds, valued at $122.71 (K. J. Shaw, p. 21).

The presence of a small number of susceptible weeds in an otherwise resistant crop in crop rotation is not a great disease hazard and does not explain the inconsistency of experimental plot rotations with farmers' rotations in control of Granville wilt of tobacco (Smith and Godfrey, p. 22).

Periods of high soil and atmospheric moisture in Wisconsin in 1938 permitted field observation of water-soaked foliage resulting from internal pressure. In tobacco seedbeds a close relation was found between the amount of such water soaking and the extent of natural infection and invasion with Bacterium angulatum. Water soaking was induced experimentally by placing heavily watered, potted plants at 100 percent relative humidity (Braun and Johnson, p. 2).

Ambalema and 448A have two different genotypic types of resistance. At flowering time the plants of each, which were inoculated when young, showed different distribution of virus 1. The virus was present in all leaves of Ambalema, but the upper leaves and leaves of upper side-shoots of 448A remained virus free (McKinney, p. 16).

A method for detecting the mosaic virus agent in the tobacco plant consists of preparing reagent-indicator-tobacco mixtures and linking a definite color reaction in the mixture to healthy and mosaic virus-diseased tissue juices (Quirk, p. 20). Note: This has been tried with several other viruses and may prove to be a valuable method for rapid identification.

Tobacco-necrosis virus and tobacco-mosaic virus were found to have the same thermal death point, but the former is more quickly inactivated at temperatures below 92° C., and the latter at temperatures above 92° C. (Price, p. 20).

Movement of tobacco-mosaic virus is correlated with food transport (Bennett, p. 1).

The concentration of tobacco-mosaic virus in the expressed juice increased as the amounts of nitrogen supplied to the plants increased. Juice from plants dwarfed by an excess of nitrogen had a higher virus concentration than juice from plants receiving a nitrogen level more conducive to rapid growth. Conclusion is that the concentration of virus in expressed juice is not necessarily determined by the growth rate of the host (Spencer, p. 22).

In making forest-tree plantings, mixtures of desirable clons should be used, rather than uniform lots of single clons, if heavy losses or destruction from diseases is to be avoided (Hartley, p. 9). Note: The same warning would seem to have application in the case of many other plants propagated vegetatively.

Nitrogen-deficient sweet-corn seedlings are not severely wilted by Aplanobacter stewartii (McNew and Spencer, p. 17). Note: Cannot be recommended as a control measure, however.

Pathogenicity of the crown-gall organism seems to depend on something other than the production of growth-promoting substances because both virulent and nonvirulent cultures may produce an equal amount of growth hormones (Lock, Riker, and Duggar, p. 16).

A third leaf-spot disease of strawberry caused by an undescribed species of Mycosphaerella is reported from Louisiana. The symptoms are so similar to those of scorch (Diplocarpon earliana) that the two are easily confused. No conidial stage has been observed, but perithecia are produced in abundance on dead leaves (Plakidas, p. 20).

(To be continued in Serial No. 38.)

MORE ABOUT POTATO SPRAY RINGS

Because of the widespread occurrence of late blight potatoes last year, there seems to be more interest on the part of potato growers in protecting their crops by spraying in 1939. In that connection the question of community spraying is likely to come up for consideration. Therefore the following sample agreement for use in organizing potato spray rings, together with comments by Dr. Charles Chupp of New York, where such rings have operated successfully for many years may be timely.

(Sample Potato Spray Ring Agreement)

Community Potato Spraying Association
(Name)

We, the undersigned, hereby make application for membership in the _____ Potato Spraying Association, and agree to conform to the rules and regulations herein contained.

Object

The object of the Potato Spraying Association is to control the insect pests and fungus diseases which limit the yield of potatoes and cause serious losses to the industry.

Plan of Organization

When fifty acres or more have subscribed to the organization, a meeting of subscribers will be called for the election of officers to manage the Association, who will purchase a suitable sprayer, spray material, hire a man to do the work, and transact such other business as will be necessary for the successful operation of the Association.

Each member of the Spraying Association agrees to pay his proportionate share per acre of the cost incurred during the season.

It is estimated that the cost per acre will be about thirteen and 50/100 dollars ($13.50), which includes the proportionate cost of a spraying machine, and each subscriber agrees to pay to the selected Treasurer the amount required before May 15, one dollar of which shall be paid the _____ Farm Bureau for technical assistance.

It is further agreed that the subscriber will furnish horsepower for the man in charge of the spraying, and board the man while at his farm; and also will leave four checkrows in each piece for the purpose of showing the increased yields due to spraying.

The _____ Farm Bureau will cooperate with the Association by assisting in securing a man to do the spraying; by assigning a technical adviser to the Association to keep in close touch with the Association, particularly in seeing that the man in charge of spraying is properly doing his work, and to detect diseases and insect pests; and by cooperating in any other way possible.

"These agreements vary considerably in one community or another. For instance, in some of the communities they put into the agreement something regarding the source of the water, the help in filling sprayers and

things of that kind. We permit each group of growers to draw up their own statement, although we use something like the above as a guide.

"In recent years, we have found it cheaper to buy a power sprayer and include more acreage in the individual rings. We also have learned that when a group of growers unite they can buy such sprayers on time, and the companies will permit them as much as 3 years to complete the payment. In this way they can pay for the sprayer by means of the increases which they get in yield. With us the average sprayer will last approximately 6 years, although sometimes they will wear out in 3 or in other cases have continued for 10 years. It all depends upon the care taken in dismantling the sprayer in the fall, cleaning it thoroughly, and submerging the metal parts in oil for the winter.

"We also have a school just before sprayingtime. We get a man from some sprayer company to show the boys how to take sprayers apart and how to make the various repairs that may be needed. This takes all the forenoon. In the afternoon the boys are given instructions regarding the making of bordeaux mixture and the controlling of diseases and insect pests. These schools are attended by county agents as well as by the men who are hired to conduct the spray rings, and have proved very profitable."

BACTERIAL RING DISEASE OF POTATO

Diagnosis

When confronted with this bacterial disease in the field or on the market, the first problem is one of accurate diagnosis. It is important that the disease be detected as early as possible when it appears in a locality in order to keep down spread. In many cases it may be recognized by its symptoms, which are characteristic. However, plants and tubers in early stages of infection may not show any symptoms, and again there are often doubtful cases. Therefore these doubtful cases and, in fact, any cases found in new localities should be verified by microscopic examinations and perhaps by cultural tests.

Symptoms

On the vines.

The symptoms usually appear late in the season (the latter part of August in Maine). An early symptom is a flaccid wilting and rolling of the leaves without much change in color the first day or two. The plants look as if they had been deprived of water. Not all the stalks in a hill will necessarily show this. On subsequent days the leaves become chlorotic; then necrotic, at first at tips and margins; and finally, brown and dead.

On the tubers.

Affected potatoes are borne on diseased vines which ordinarily show a wilting and premature death. However, if they are only slightly affected, or affected late in the season, the vines may not show any particular symptoms. Except in the late stages, the disease in the potato tuber cannot be detected without cutting. The decay is easily confused with others such as bacterial soft rot, late blight rot and some of the Fusarium rots. This is particularly true when it is in late stages and when secondary decays have set in to complicate the picture. The disease does not resemble Fusarium wilt, Verticillium wilt, net necrosis, nor what is ordinarily spoken of as stem-end browning. These diseases produce firm, dry, and brown discolorations. This is not true with the ring-rot disease.

As the name implies, it is at first a ring disease, caused by bacteria that enter the potato through the stolon and spread along the vascular ring and change the ring to a yellowish, creamy, or very light brown color. There is no dark discoloration of the vascular ring. The decay extends all the way through the potato from the stem end to the bud end. Affected tissues are likely to be of a cheesy or crumbly consistency and odorless, except when secondary decay has occurred. Pockets of soft, diseased tissues are formed, not only in the region of the vascular tissues, but are scattered through the tubers.

After the bacteria have spread through the tuber secondary invasion by soft-rot organisms is liable to follow. When this occurs, the potato quickly breaks down in a soft, wet decay. Sometimes the center of the tuber is rotted away, leaving the cortex somewhat intact, in which case we have a somewhat firm shell, enclosing soft, disintegrating tissue. In late stages of decay the rot is noticeable from outside the potato, and the skin sometimes cracks open.

All stages of decay from slight discoloration of the vascular ring to complete breakdown of the potato are likely to be found in any given lot. The disease spreads with the seed. The cutting knife is responsible for spread of bacteria from diseased to healthy tubers. The occurrence of this disease offers another problem for potato growers and handlers. Eventually, it will be solved satisfactorily, but in the meantime inspectors and others having to do with handling potatoes are asked to keep watch for tubers showing symptoms as described above and to bring them to the attention of market pathologists and potato pathologists for definite determination.

Directions For Making Bacterial Smears

(From Racicot, Saville, and Conners, Amer. Potato Jour. 15: 316. November 1938)

The equipment needed for making smears in the field is a knife, scalpel, razor blade, or razor, alcohol, absorbent cotton, and microscope

slides. The cutting instrument should be very sharp, free from nicks, and used exclusively for this purpose. The slides should be ruled in six squares with a diamond or wax pencil. The latter is quite satisfactory, and there is less danger of the slides breaking. A large space is kept on the left for the number of the slide or slide label, and a smaller space on the right, in order to be able to cover the field with the objective of a microscope with a mechanical stage. It is only necessary to number the slide, but the squares should always be used in the same order.

In making a smear from a stem, the knife is first cleaned with a wad of absorbent cotton moistened with alcohol, to make sure that there are no bacteria on the blade. The cotton is used only once. The stem is then cut 2 or 3 inches above ground, and the cut end pressed lightly against the slide inside of one of the squares. Careful notes are kept of the symptoms of the plant, locality, date, variety, and the number of the slide and smear. The knife should be cleaned immediately after making a smear.

In making smears from tubers, only slightly affected tubers should be used. A cut should be made with the clean knife at the side of the tuber, removing a thin slice. The knife is then cleaned, and the tuber cut across the stolen end, cutting through the freshly cut surface, and removing a thin slice at right angles to the first. Then a small piece is removed from the shoulder where part of the vascular ring is exposed, choosing an area that is discolored and suspected of harboring the bacteria. The end of the piece is lightly pressed against the slide inside another square.

The smears are then allowed to dry, taking care not to rub them against anything. These can be kept almost indefinitely, until the laboratory is reached, or they may be mailed for examination. Wooden microslide mailing cases are the most convenient for mailing slides, as one or more slides can be mailed at one time.

The Gram-Positive Stain

The bacterium that causes this disease (Bacterium sepedonicum Spiekermann and Kotthoff) is one of the very few bacterial plant pathogens, and the only potato organism that takes a Gram-positive stain. Racicot, et al (cited in a preceding paragraph), describe a method as follows:

"The smears are fixed to the glass slide by heating until it is just too hot to bear against the back of the hand, and stained with a differential Gram stain.

"The rapid Gram stain formula devised by Prof. G. B. Reed, Queen's University, Kingston, Ontario, Can., but hitherto unpublished, is recommended for use, having given us satisfactory preparations of unusual brilliance, when tested.

Solutions: (1) Crystal Violet (or Gentian Violet)..... 2.5 gms.
Water.....1000 cc.
(2) Sodium bicarbonate..... 12.5 gms.
Water.....1000 cc.
(3) Iodine..... 20 gms.
Sodium hydroxide (Molar solution)..... 100 cc.
Water..... 900 cc.

Dissolve the iodine in the sodium hydroxide solution, and dilute with the water.

(4) Ethyl alcohol, 95 percent..... 750 cc.
Acetone..... 250 cc.
(5) Basic fuchsin, saturated solution in 95-percent alcohol..... 100 cc.
Water..... 900 cc.

"The solutions keep indefinitely. The procedure for staining is as follows: Flood the smear with equal parts of (1) and (2) for about 10 seconds, then drain off the excess. Flood with (3) for about 10 seconds and then wash with water. Flood with (4) until no more color comes away, about 5 to 10 seconds, and then wash with water. Flood with (5) for not over 2 or 3 seconds, wash with water, and then dry. For immediate examination, the smears can be blotted lightly with filter paper, taking care that it does not slide over the surface. A drop of immersion oil can then be placed directly over the smear and examined under the oil-immersion objective of the microscope.

"The bacteria causing bacterial wilt and rot are small, short rods, 0.3-0.5 x 0.6-0.9 microns in size, and staining dark blue or black. If Gram-positive bacteria exceeding 1 micron in length are found, it is certain that these are soil-inhabiting organisms that have invaded diseased tubers or stems. It should not be concluded that bacterial wilt and rot is present if only a few scattered bacteria are found in the smear. If the disease is present, the bacteria will be abundant in at least some parts of the smear."

Collecting and Mailing Specimens

The lower part of the stem of affected plants is best for sending in for laboratory diagnosis as it is less likely to decay and is better for making smears and isolations. Six- or eight-inch lengths of stems packed in damp (not wet) newspaper should carry well. If tubers are to be sent, select only those in early stages of decay and wrap separately in plenty of dry newspaper before packing. Notes on date and place of collection, variety, symptoms, and other information should be included with the specimens.

--R. J. Haskell

1938 TOMATO-SEED SOURCE DEMONSTRATION IN VIRGINIA

The 1938 tomato-seed source demonstration and variety test was conducted on the farm of W. S. Straughan, Hague, Westmoreland County, Va., in cooperation with the Virginia Truck Experiment Station: The plot, well over an acre in size, was on land known to be heavily infected with wilt. The plants were grown in open seedbeds and transplanted to the field on May 26-27. An excellent stand was obtained and very little replanting was necessary. On the basis of soil tests, the plot was limed at the rate of 1,000 pounds an acre and fertilized with a 3-12-6 fertilizer at the rate of 1,000 pounds an acre. One-half of this fertilizer was broadcast in the row before planting time and the other half applied at the second cultivation. Due to the prevalence of the common potato bug, the field was dusted once with copper-lime-arsenate dust and once with rotenone. The plot was well cultivated as long as vine growth permitted.

The chief purpose of the demonstration was to compare 16 strains of Marglobe seed. Stone and Greater Baltimore varieties were used as checks. In addition to the Marglobe strains, other strains of wilt-resistant varieties tested were 6 strains of Rutgers, 3 of Pritchard, and 2 of Norton. One strain each of 6 other varieties was also included. Except where otherwise indicated, each strain was represented by 25 plants in each of 5 separate replications, making a total of 125 plants for the strain. Records were made on trueness to type, resistance to wilt, and on yield. The summarized record follows.

Variety or Source	Percent off-type	Percent wilt		Wilt grade		Yield per acre in bushels
		Aug.11	Sept.6	Aug.11	Sept.6	
Stokes Master (Cert)	0	8.1	71.8	0.15	2.29	345.2
Southern States Coop. Super. (Cert)	0	8.0	79.2	0.12	2.38	264.6
Southern States Coop. (Cert)	0.8	6.4	56.8	0.09	1.50	273.5
Griffith & Turner	4.0	44.8	88.8	1.04	3.00	263.9
R. O. Dean (Cert)	0	2.4	68.0	0.05	1.82	292.6
E. Miller Richardson Co.	1.6	8.9	65.3	0.11	1.73	235.8
Ferry Morse Supreme (Cert)	0	6.5	63.4	0.09	1.72	255.9
Associated Seed Growers	4.1	15.4	61.8	0.27	1.75	266.4
Maryland Seed Co. (Cert)	0	8.9	57.7	0.10	1.47	276.2
Associated Seed Growers (Cert)	0.8	5.7	61.8	0.09	1.76	298.4
T. W. Wood & Sons	0.8	14.4	69.6	0.21	1.87	230.0
Tri-State Pakcers Assoc.	0	9.8	65.8	0.11	1.86	267.5
Geo. Tait & Sons	1.6	9.8	57.7	0.13	1.68	240.9
T. W. Wood & Sons (Cert)*	0	7.1	54.5	0.09	1.48	237.6
Unruh Brokerage Co.(Cert)	0	8.1	56.5	0.10	1.52	204.0
Landreth Seed Co. (Cert)	0.8	4.1	61.8	0.06	1.76	265.9

Variety or Source	Percent off-type	Percent wilt		Wilt grade		Yield per acre in bushels
		Aug.11	Sept.6	Aug.11	Sept.6	
Average 16 Marglobe Strains	0.9	10.5	65.0	0.18	1.85	263.6
Greater Baltimore (Cert) Check	-	58.1	91.1	1.23	3.33	228.9
Stone - Check	-	44.8	84.8	0.98	2.99	282.6
Average 2 Checks	-	51.4	87.9	1.10	3.16	255.7
Rutgers-Landreth(Cert)*	2.0	13.0	68.0	0.16	1.93	238.3
Rutgers-Maryland*	1.0	3.0	52.0	0.05	1.43	309.6
Rutgers-Unruh (Cert)*	0	7.0	52.0	0.08	1.34	277.9
Rutgers-Stokes (Cert)***	0	2.0	44.0	0.04	1.04	251.4
Rutgers-Wood (Cert)*	1.0	10.1	58.6	0.13	1.61	302.6
Rutgers-Assoc.Seed Growers (Cert)*	2.0	7.0	76.0	0.09	2.00	246.5
Average 6 Rutgers Strains	1.0	7.0	58.4	0.09	1.56	271.0
Pritchard-Unruh (Cert)**	0	8.1	87.8	0.11	2.91	326.3
Pritchard-Wood (Cert)**	12.0	25.3	90.7	0.45	3.11	272.8
Pritchard-Tait (Cert)**	9.3	14.7	69.3	0.35	2.15	295.1
Average 3 Pritchard Strains	7.1	16.0	82.6	0.30	2.72	298.1
Norton-Wood	-	5.6	67.6	0.06	1.47	257.4
Norton-Tait	-	3.2	57.3	0.03	1.42	264.4
Average 2 Norton Strains	-	4.4	62.4	0.04	1.44	260.9
Stokesdale*	-	19.0	83.0	0.34	2.55	236.9
Browns Special - Landreth*	-	71.0	97.0	1.36	3.75	240.3
Grothens Globe - Unruh (Cert)*	-	12.0	62.0	0.18	1.87	257.5
Valiant - Stokes(Cert)***	-	12.0	64.0	0.36	2.26	239.2
Cleveland Banner-Templin-Bradley Co.***	-	36.7	79.6	0.67	2.61	178.8
Riverside - Haven Seed Co.****	-	0.0	24.0	0.00	0.56	260.5

*Occurred in 4 replications; **3 replications; ***2 replications; ****1 replication.

Trueness to Type

In the Marglobe strains, off-type ranged from 0 pct. to 4 pct. with an average for the 16 strains of 0.9 pct. For the 6 Rutgers strains, off-type ranged from 0 pct. to 2 pct. with an average of 1 pct. For the Pritchard strains, off-type ranged from 0 pct. to 12 pct. with an average of 7.1 pct. Type counts were not made on the other varieties.

Resistance to Wilt

As will be noted from the table, the wilt data for the tomato seed-source plots are based on two counts made on August 11 and September 6. At the time of each count the plants were grouped in regard to wilt as healthy, slightly infected, moderately infected, severely infected, and dead because of wilt. In the final tabulation the plants were graded in regard to severity of wilt at the date of each count. The grades were as follows: Slightly infected, 1; moderately infected 2; severely infected 3; dead because of wilt, 4. The total number of plants falling in each group was multiplied by the grade of the group, the products were then added, and divided by the total number of both healthy and wilt-infected plants to obtain the grade for the variety or seed source at the date of the count.

For the 16 Marglobe strains, the wilt grade on August 11 ranged from 0.05 to 1.04, with an average of 0.18 compared to 1.10 for the average of the Greater Baltimore and Stone checks on the same date; on September 6, from 1.48 to 3.00 with an average of 1.85 as compared to 3.16 for the checks.

The percentage of plants infected by wilt on August 11 in the 16 Marglobe strains ranged from 2.4 pct. to 44.8 pct. with an average of 10.5 pct. compared with 51.4 pct. for the checks; on September 6, the percentage of plants infected by wilt in the 16 Marglobe strains ranged from 54.5 pct. to 88.8 pct. with an average of 65.0 pct. compared to 87.9 pct. for the checks. The wilt data for the other varieities may be studied in the table. For all varieties it is believed that the wilt grade and the percent wilt on August 11 are the more important figures, since wilt which strikes early in the season does more damage than later infestation.

Yields

It will be noted that the yield per acre for the Marglobe strains ranged from 204.0 to 345.2 bushels per acre with an average yield of 263.6 bushels compared with an average of 255.7 bushels for the check. Yields and averages for the other varieties may be noted in the table.

The 1938 season was much better for tomato production in the Northern Neck than was the 1937 season. The average yield for the Marglobe strains in 1938 was 263.6 bushels per acre compared with 37.5 bushels in 1937. The checks yielded 255.7 bushels per acre in 1938 compared with 55.6 bushels in 1937.

The yield figures are not considered significant insofar as they reflect correlation between wilt and yield. The wilt did not strike the plot seriously until after most of the varieties had set considerable fruit and until after much of this fruit had attained good size. As previously stated, wilt which strikes early in the season does more damage than later infestation. Variation between replications was extreme, which

was another reason for not considering the yield figures significant. It appears also that there is considerable variation in the yielding ability of the various strains of Marglobe without reference to their wilt resistance. For that reason it would be interesting to compare all these strains as to their yielding ability on wilt-free soil.

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COTTONSEED TREATMENT A PROFITABLE PRACTICE

(Clemson College, S. C. November 14, 1938.)--Six dollars an acre from 200 pounds more of seed cotton is the estimated average increase to South Carolina farmers who used treated seed this past season, says W. C. Nettles, extension entomologist, giving other evidence of the value and use of this practice.

Reports from many county agents show that cottonseed treatment has been successful in increasing vigor, stands, and yields of cotton, and that the practice now appears to be an established one on many farms.

Approximately 100,000 pounds of the organic mercury dust were shipped, for treating, into the State this season. This amount is sufficient to treat 533,000 bushels. However, since some of the treated seed was shipped out of the State by seed breeders, and since most farmers plant slightly over 1 bushel to the acre, it is reasonable to assume, Mr. Nettles states, that 400,000 acres were planted with treated seed.

Estimating that 400,000 acres, or approximately one-third of the acreage in the State, were planted with treated seed, South Carolina farmers thus harvested $2,400,000 worth more of cotton by treating seed than they would have harvested otherwise. Had all the seed in the State been treated, the increase would have been $7,200,000, after paying for the cost of treatment.

The average increase of 200 pounds more of seed cotton per acre is based on results from over 200 cottonseed treatment demonstrations which have been completed by South Carolina farmers in the past 4 years.